

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (*Currently amended*) Apparatus for the delivery of ions generated at atmospheric
2 pressure to a mass spectrometer having a vacuum system with an entrance
3 opening, the apparatus comprising:
4 (a) an ion generator that generates an ionization cloud containing ions at
5 atmospheric pressure,
6 (b) an ion migration drift tube between the ionization generator and the entrance
7 opening, the drift tube receiving the ionization cloud,
8 (c) a field-generating apparatus that produces a DC potential gradient with curved
9 equipotential surfaces inside the ion migration drift tube that draws ions of the
10 ionization cloud toward the entrance opening, and
11 (d) a gas port through which a gas may be introduced to the ion migration drift
12 tube in a direction opposite to a direction of ion travel.
- 1 2. (*Previously presented*) Apparatus according to Claim 1 wherein the ion generator
2 comprises an electrospray apparatus with a spray capillary that sprays a solution
3 containing analyte molecules.
- 1 3. (*Original*) Apparatus according to Claim 2 wherein a pneumatic gas device
2 supports the spraying.
- 1 4. (*Previously presented*) Apparatus according to Claim 2 further comprising an
2 arrangement of electrodes and power supplies that produce a strong electric field
3 in front of the spray capillary.
- 1 5. (*Previously presented*) Apparatus according to Claim 1 wherein the ion generator
2 comprises a pulse laser that forms an ionization cloud by laser desorption.

- 1 6. (*Previously presented*) Apparatus according to Claim 1 further comprising a
2 ionization gas input path through which gaseous substances may be admixed to
3 the ionization cloud prior to its entry into the drift tube.
- 1 7. (*Previously presented*) Apparatus according to Claim 1 further comprising a
2 needle for producing corona discharge in the vicinity of the ionization cloud.
- 1 8. (*Previously presented*) Apparatus according to Claim 1 further comprising a UV
2 lamp for photoionization in the vicinity of the ionization cloud.
- 1 9. (*Previously presented*) Apparatus according to Claim 1 further comprising an
2 electron source in the vicinity of the ionization cloud.
- 1 10. (*Original*) Apparatus according to Claim 9 wherein the electron source contains a
2 foil emitting beta radiation.
- 1 11. (*Previously presented*) Apparatus according to Claim 1 wherein the gas port
2 introduces gas into the drift tube near the entrance opening of the mass
3 spectrometer.
- 1 12. (*Previously presented*) Apparatus according to Claim 11 the gas introduced
2 through the gas port is heated before introduction into the drift tube.
- 1 13. (*Previously presented*) Apparatus according to Claim 1 wherein the the ion
2 migration drift tube comprises a plurality of electrodes that produce the potential
3 gradient in the drift tube.
- 1 14. (*Previously presented*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube comprises a resistance material.
- 1 15. (*Previously presented*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube has a conical or trumpet shape with a wider opening being directed
3 towards the ion generator.

- 1 16. (*Previously presented*) Apparatus according to Claim 1 wherein an opening of
2 the ion migration drift tube facing the ion generator is covered by a grid which
3 bulges outwards.
- 1 17. (*Previously presented*) Apparatus according to Claim 1 wherein the entrance
2 opening is part of a transfer capillary, and wherein an outer shape of a tip of the
3 transfer capillary is convex.
- 1 18. (*Previously presented*) Apparatus according to Claim 1 wherein the entrance
2 opening approximates a funnel shape.
- 1 19. (*Previously presented*) Apparatus according to Claim 1 further comprising a
2 ionization gas input path through which a hot drying gas and charged particles
3 may be admixed to the ionization cloud, the particles having a charge that allows
4 them to neutralize ions in the spray chamber or later in the drift tube.
- 1 20. (*Previously presented*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube has a curved shape.
- 1 21. (*Previously presented*) Apparatus according to Claim 1 wherein the ion migration
2 drift tube is a first drift tube, and wherein the apparatus further comprises
3 additional drift tubes such that the ion migration drift tubes are connected to one
4 another.
- 1 22. (*Canceled*)
- 1 23. (*Previously presented*) Method for feeding ions at atmospheric pressure to a
2 mass spectrometer, the method comprising the following steps:
3 (a) forming an ionization cloud containing charged particles at atmospheric
4 pressure,
5 (b) guiding the charged particles by their ion mobility through an ion migration drift
6 tube ~~with an inner potential gradient to~~ and focusing them into an entrance
7 opening of the mass spectrometer with a DC potential gradient having curved
8 equipotential surfaces, and

9 (c) blowing gas into the ion migration drift tube from adjacent the entrance
10 opening.

1 24. (*Original*) Method according to Claim 23 wherein the ionization cloud is created
2 by spraying a solution containing dissolved analyte from a spray capillary.

1 25. (*Original*) Method according to Claim 24 wherein the spraying is pneumatically
2 supported by a spray gas.

1 26. (*Previously presented*) Method according to Claim 24 further comprising drawing
2 charged droplets into the ionization cloud using a strong electric field in front of
3 the spray capillary.

1 27. (*Original*) Method according to Claim 23 wherein the ionization cloud is created
2 by bombardment of a sample with light from a pulsed laser.

1 28. (*Previously presented*) Method according to Claim 23 further comprising
2 admixing other gaseous substances to the ionization cloud.

1 29. (*Previously presented*) Method according to Claim 23 further comprising
2 providing a corona discharge that produces primary ions in the vicinity of the
3 ionization cloud which lead to chemical ionization of the analyte molecules via a
4 chain of ion-molecule reactions.

1 30. (*Previously presented*) Method according to Claim 23 further comprising using a
2 UV lamp for ionizing substances in the ionization cloud.

1 31. (*Previously presented*) Method according to Claim 23 further comprising using
2 an electron source for ionizing substances in the ionization cloud.

1 32. (*Previously presented*) Method according to Claim 31 wherein a foil emitting beta
2 radiation is used as the electron source.

- 1 33. (*Previously presented*) Method according to Claim 23 wherein the gas is
2 introduced into the drift tube in a direction opposite the travel direction of the
3 charged particles.
- 1 34. (*Previously presented*) Method according to Claim 33 wherein the gas is heated
2 before being introduced into the drift tube.
- 1 35. (*Previously presented*) Method according to Claim 23 further comprising
2 admixing charged particles to the gas, whereby the particles neutralize some of
3 the ions in the drift tube.
- 1 36. (*Previously presented*) Method according to Claim 35 further comprising
2 irradiating an area around the entrance opening with UV radiation to release
3 photoelectrons that neutralize ions.
- 1 37. (*Canceled*).